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## ARMY DIGITAL TERRAIN DATA REQUIREMENTS

The U.S. Army has taken two critical actions to ensure that the digital terrain data (DTD) needs of our troops on future battlefields are satisfied. The first was to establish, in support of the Deputy Chief of Staff for Intelligence (DCSINT) and in concert with the Defense Mapping Agency (DMA), standards and architectures for the composition, use and distribution of DTD. The second action was to establish, within the U.S. Army Engineer Topographic Laboratories (USAETL), a group whose mission is to serve as the Army's center of technical expertise for all military applications of DTD.

During 1982-1984, the Army performed a study of their materiel development, operations research, and test and evaluation organizations that documented all known and anticipated requirements for digital terrain data. Based upon this study, two standards were developed to provide for the consolidation of DMA production efforts and to support the entire spectrum of Army users. These standards, termed Tactical Terrain Data and Special Terrain Data are described as follows:

Tactical Terrain Data (TTD) is comprised of a data set similar in content, accuracy and resolution to a Class B, 1:50,000 scale topographic map, a 1:50,000 Tactical Terrain Analysis Data Base, and a Marine Combat Chart. TTD will contain unsynthesized and unsymbolized feature and attribute data plus elevation data. Feature and attribute data will include information about the size, shape, location and height of extracted features. The elevation matrix will contain elevation posts every 30 meters referenced to the World Geodetic System. TTD is considered the Army's operational support data base and will meet most user requirements.

Special Terrain Data (STD) is comprised of elevation and feature data sets similar to TTD, but is much more detailed and accurate, being roughly equivalent to a 1:12,500 scale topographic map.

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^ The Defense Mapping Agency has recognized Army's need for the TTD product, but indicated that STD would be difficult to produce using current and planned production systems at DMA. Higher resolution STD is still required, but new DMA production solutions are needed. Some possibilities, at least on an interim basis, include having an Army user employ TTD as a base to establish geometry, best-fit it to higher-resolution source material such as the new generations of multispectral imagery, and extract more dense feature data as required.

Coupled with the development of the data standards described above, the Army recognized the need to control and coordinate DTD requirements to ensure; they were not overstated, they could be met today via DMA standard products and in the future via TTD and/or STD, and the Army does not pay more than once for the same technology. To meet these challenges, the Concepts and Analysis Division was established at USAETL on 1 October 1986.

The Concepts and Analysis Division performs the following functions: (a) provide technical support in the form of analytical studies and trade-off analyses to the Army research and development (R&D) community; (b) assist in defining minimum essential DTD requirements and support the materiel development process; (c) conduct technical liaison with DMA, the Department of Defense, the Department of Army and private industry to maintain a complete awareness of all requirements and state-of-the-art means to meet these requirements; (d) interact with combat developers and the Army Analysis Community to inform them of potential applications and limitations of DTD and related technology; (e) serve as the Army focal point for distribution and evaluation of prototype digital topographic data bases to ensure centralized control of developer requirements; and (f) develop special software for manipulating DMA standard digital products to optimize use of DMA produced DTD and minimize transformation costs.

In October 1986, the Assistant Chief of Engineers tasked the Concepts and Analysis Division to analyze the DTD requirements of tactical systems that would be operational by FY93. In all,

fourteen systems were identified. Although most systems are being designed to utilize standard digital products of DMA, over half were found to require TTD as well. Most of these systems also have a need for an electronic map display. At present, CAD is engaged in an analysis of emerging electronic map display requirements. A final Army requirement will be articulated to DMA by 1 January 1988.

Implementation of USAETL's Concepts and Analysis Division goals will result in numerous benefits for the Army. It will provide the Army with the capability for identifying emerging DTD requirements as early as possible in the R&D cycle, when implementation costs are lowest. It will also provide the technical support necessary for productive management of DTD requirements. In some cases, analysis will play a key role in precluding the development of systems that cannot be cost effectively supported with existing or reasonably available DTD. This work alone will save the Army millions of dollars in R&D, operations and support costs.

To date, Army developers have been forced into seeking ad hoc solutions to data transformation problems. In the future, the number of tactical users of DTD will increase dramatically. The battlefield of the future requires that these systems perform using a common multi-user data base. It is hoped that inefficient expenditure of resources and use of unique specialized data bases by Army developers will be minimized in the near-term and eliminated in the long-term through the efforts of the Concepts and Analysis Division. It will provide a single focal point for DTD-related technical information and expertise for all Army users. It will also ensure that development, distribution and evaluation of all future prototype data bases are accomplished at one centralized location.

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